

AMENDMENTS TO THE CLAIMS

This listing of claims replaces all prior versions, and listings, of claims in the application.

1. (Currently Amended) A water treatment apparatus comprising:

an ultraviolet radiation unit radiating ultraviolet light;

an ultraviolet radiation part having an elongated tubular configuration, an internal surface, and receiving therein said ultraviolet radiation unit ~~with a space between an inner peripheral, said ultraviolet radiation unit being spaced from said internal surface of said ultraviolet radiation part and said ultraviolet radiation unit to pass for passage of wastewater therethrough between said ultraviolet radiation part and the internal surface;~~ and

an oxidizer mixing part that is disposed adjacent to, in fluid communication with, and upstream of said ultraviolet radiation part, wherein said oxidizer mixing part includes a minimum cross-sectional area part ~~at~~ having an oxidizer suction port for drawing an oxidizer supplied from an oxidizer supply part into wastewater flowing in said oxidizer mixing part and past said oxidizer suction port, and wherein the minimum cross-sectional area part is constricted to a first cross-sectional area, and

a conical part having a tapered configuration that expands from said minimum cross-sectional area part to a large passage part having a ~~thickness~~ cross-sectional area substantially the same as ~~that~~ the cross-sectional area of said ultraviolet radiation part, wherein said ultraviolet radiation part has a diameter so that ultraviolet light radiated by said ultraviolet radiation unit has an intensity at said internal surface that is at least 30 W/m².

2. (Previously Presented) The water treatment apparatus according to claim 1, wherein distance from said minimum cross-sectional area part to said ultraviolet radiation part is no more than 50 cm.

3. (Currently Amended) The water treatment apparatus according to claim 1, wherein distance from said minimum cross-sectional area part to a range in which the ultraviolet light ~~irradiated~~ radiated by said ultraviolet radiation unit has an intensity of at least 100 W/m^2 is no more than 50 cm.

4. (Previously Presented) The water treatment apparatus according to claim 1, further comprising a flow passage for drawing treated water that has passed said ultraviolet radiation part and returning the treated water to a location upstream of said minimum cross-sectional area part.

Claim 5 (Cancelled).

6. (Currently Amended) ~~The A~~ water treatment apparatus ~~according to claim 1~~ comprising:

an ultraviolet radiation unit radiating ultraviolet light;

an ultraviolet radiation part having an elongated tubular configuration, an internal surface, and receiving therein said ultraviolet radiation unit, said ultraviolet radiation unit being spaced from said internal surface of said ultraviolet radiation part for passage of wastewater between said ultraviolet radiation part and the internal surface; and

an oxidizer mixing part that is disposed adjacent to, in fluid communication with, and upstream of said ultraviolet radiation part, wherein said oxidizer mixing part includes

a minimum cross-sectional area part having an oxidizer suction port for drawing an oxidizer supplied from an oxidizer supply part into wastewater flowing in said oxidizer mixing part and past said oxidizer suction port, wherein the minimum cross-sectional area part is constricted to a first cross-sectional area, and

a conical part having a tapered configuration that expands from said minimum cross-sectional area part to a large passage part having a cross-sectional area substantially the same as the cross-sectional area of said ultraviolet radiation part, wherein said ultraviolet radiation part has a diameter so that the ultraviolet light has an intensity at said ~~inner peripheral~~ internal surface that is at least 10% stronger than

intensity of the ultraviolet light at an ultraviolet radiation surface of said ultraviolet radiation unit.

Claims 7-9 (Cancelled).

10. (Previously Presented) The water treatment apparatus according to claim 1, wherein said oxidizer is selected from the group consisting of ozone, an ozone containing gas, and ozone dissolved in a liquid.

11. (Currently Amended) ~~The A~~ water treatment apparatus ~~according to claim 10~~ comprising:

an ultraviolet radiation unit radiating ultraviolet light;

an ultraviolet radiation part having an elongated tubular configuration, an internal surface, and receiving therein said ultraviolet radiation unit, said ultraviolet radiation unit being spaced from said internal surface of said ultraviolet radiation part for passage of wastewater between said ultraviolet radiation part and the internal surface; and

an oxidizer mixing part that is disposed adjacent to, in fluid communication with, and upstream of said ultraviolet radiation part, wherein said oxidizer mixing part includes

a minimum cross-sectional area part having an oxidizer suction port for drawing an oxidizer supplied from an oxidizer supply part into wastewater flowing in said oxidizer mixing part and past said oxidizer suction port, wherein the minimum cross-sectional area part is constricted to a first cross-sectional area, and

a conical part having a tapered configuration that expands from said minimum cross-sectional area part to a large passage part having a cross-sectional area substantially the same as the cross-sectional area of said ultraviolet radiation part,
wherein

the oxidizer is selected from the group consisting of ozone, an ozone-containing gas, and ozone dissolved in a liquid, and

the product of a distance D from said ~~inner peripheral~~ internal surface to an ultraviolet radiation surface of said ultraviolet radiation unit and

$[1000e^{\{2.3(290h[O_3G] + 320[O_3L] + 1.86[H_2O_2])\}}/100]/\{2.3(290h[O_3G] + 320[O_3L] + 1.86[H_2O_2])\}^{1.5}$
 (where h: a gas holdup, $[O_3G]$: gaseous phase ozone concentration, $[O_3L]$: liquid phase ozone concentration, and $[H_2O_2]$: hydrogen peroxide concentration) is in a range from 0.01 to 0.1.

12. (Currently Amended) ~~The A~~ water treatment apparatus according to claim 10 comprising:

an ultraviolet radiation unit radiating ultraviolet light;

an ultraviolet radiation part having an elongated tubular configuration, an internal surface, and receiving therein said ultraviolet radiation unit, said ultraviolet radiation unit being spaced from said internal surface of said ultraviolet radiation part for passage of wastewater between said ultraviolet radiation part and the internal surface; and

an oxidizer mixing part that is disposed adjacent to, in fluid communication with, and upstream of said ultraviolet radiation part, wherein said oxidizer mixing part includes

a minimum cross-sectional area part having an oxidizer suction port for drawing an oxidizer supplied from an oxidizer supply part into wastewater flowing in said oxidizer mixing part and past said oxidizer suction port, wherein the minimum cross-sectional area part is constricted to a first cross-sectional area, and

a conical part having a tapered configuration that expands from said minimum cross-sectional area part to a large passage part having a cross-sectional area substantially the same as the cross-sectional area of said ultraviolet radiation part, wherein the oxidizer is an ozone-containing gas and the concentration of the ozone is at least in the ozone-containing gas is in a range from 100 to 1,000 g/m³(N).

13. (New) The water treatment apparatus according to claim 6, wherein distance from said minimum cross-sectional area part to said ultraviolet radiation part is no more than 50 cm.

14. (New) The water treatment apparatus according to claim 6, wherein distance from said minimum cross-sectional area part to a range in which the ultraviolet light

radiated by said ultraviolet radiation unit has an intensity of at least 100 W/m^2 is no more than 50 cm.

15. (New) The water treatment apparatus according to claim 6, further comprising a flow passage for drawing treated water that has passed said ultraviolet radiation part and returning the treated water to a location upstream of said minimum cross-sectional area part.

16. (New) The water treatment apparatus according to claim 6, wherein said oxidizer is selected from the group consisting of ozone, an ozone containing gas, and ozone dissolved in a liquid.